Appendix 8.

Field Key to the NVCS Vegetation Associations at Badlands National Park

PLANT ASSOCIATION/ALLIANCE KEY - BADLANDS NATIONAL PARK

How to Use the Key--- On the following pages, associations/alliances are arranged in twenty-two dichotomous couplets with corresponding field descriptions. Starting with number "1", read through the statements and choose the one that is most appropriate. If necessary, follow the numbers within parentheses until a "best match" is found. Read the description to verify the match. It may be necessary to compare descriptions for similar associations by backtracking. The map code for each association is given in parenthesis after each association name. Note that not all associations were mapped directly (1:1) on the BADL map, so some may not appear directly on the map.

There will be some stands that do not match any of the descriptions exactly. Many plant associations are variable in composition, and while the descriptions attempt to address variability, there will be exceptions. Stands can represent transition zones between two types. There can be small inclusions of one type in larger stands of another. It is important to survey sufficiently large stands (~0.5 ha or at least 50 m diameter area around a point, or at least 100 m length in riparian areas) when classifying, and to base decisions on representative areas within stands.

1. Site unvegetated to <25% vegetated; comprised of eroding cliffs, mounds, haystacks, fans, drainages, and flats formed from mudstone, claystone, siltstone, and some sandstone. ***Badlands Sparse Vegetation Complex*****.** (Map Unit 1)

Four associations occur within this complex, and each has their own description:
***Artemisia longifolia* Badlands Sparse Vegetation,**
***Eriogonum pauciflorum - Gutierrezia sarothrae* Badlands SparseVegetation,**
Eroding Great Plains Badlands Sparse Vegetation,
Shale Barren Slopes Sparse Vegetation.

1. Site vegetated >25%; topography is varied and developed soils are present (**2**).
2. Site supports >10% tree and/or shrub aerial cover (**3**).
2. Site mostly herbaceous; grasses and forbs, shrubs and/or trees, if present, providing <10% aerial cover (**16**).

3. Site mostly vegetated by trees >4 m tall (tree cover >10%, and typically >25%) (**4**).
3. Site mostly vegetated by shrubs <4m tall (shrub cover >10%, and typically >25%) (**7**).

4. Trees mostly evergreen, *i.e.*, Rocky Mountain juniper and ponderosa pine (**5**).
4. Trees mostly deciduous, *i.e.*, cottonwood, peachleaf willow, green ash, American elm; rarely Russian-olive (**6**).

5. Ponderosa pine present, >25% aerial cover, associated with Rocky Mountain juniper, littleseed ricegrass, and little bluestem; occupies table margins and upper drainages typically on very shallow range sites.
***Pinus ponderosa / Juniperus scopulorum* Woodland**. (Map Unit 43)


5. Rocky Mountain juniper present, >25% aerial cover, associated with littleseed ricegrass and green ash, and ponderosa pine <25% cover; occupies slumps, drainages, mesic slopes, and table margins on a variety of range sites.
***Juniperus scopulorum / Oryzopsis micrantha* Woodland**. (Map Unit 44)


6. Softwoods of various age classes, occurring on floodplains, drainages, and pond/reservoir shorelines; trees mostly plains cottonwood with some peachleaf willow present. Rarely, stands of *Elaeagnus angustifolia* may occur.

***Populus deltoides* - (*Salix amygdaloides*) / *Salix exigua* Woodland** or
***Elaeagnus angustifolia* Semi-natural Woodland**. (Map Unit 41)



6. Hardwoods of draws, hillside slumps, and small floodplains; trees mostly green ash, sometimes American Elm, or rarely, Elm-Willow.

***Fraxinus pennsylvanica* - *Ulmus americana* / *Prunus virginiana* Woodland**. (Map Unit 42)


7. Soils of sands, sandy, and loamy terrace range sites; shrubs <1m tall, predominantly sand sagebrush and/or yucca (**8**).

7. Soils various, mostly of clayey and silty range sites; shrubs of various heights to 4 m tall, predominantly silver sagebrush, American plum, three-leaved sumac, western snowberry (wolfberry), sandbar willow, greasewood, and/or rabbitbrush (**9**).

8. Shrubs rounded, green, leaves sharp and spiny to the touch; occupies table margins, upper hillslopes, low sandy ridges, and steep breaks. Shrub cover typically 10-25%.
***Yucca glauca / Calamovilfa longifolia* Shrub Herbaceous Vegetation**. (Map Unit 21)

8. Shrubs rounded, blue-green, soft to the touch, aromatic; occupies sandhills, sandy ridges and sandy valleys. Shrub cover typically >20%.
***Artemisia filifolia / Calamovilfa longifolia* Shrubland**. (Map Unit 32)

9. Shrubs of riverbanks, streamsides, wet drainages, wetland margins, moist swales, and saline clay hardpans (**10**).

9. Shrubs of various upland habitats (**14**).

10. Shrubs tall, >2 m, predominantly silver buffaloberry and sandbar willow (**11**).

10. Shrubs short, <1.5 m, predominantly greasewood, western snowberry (wolfberry) and silver sagebrush (**12**).

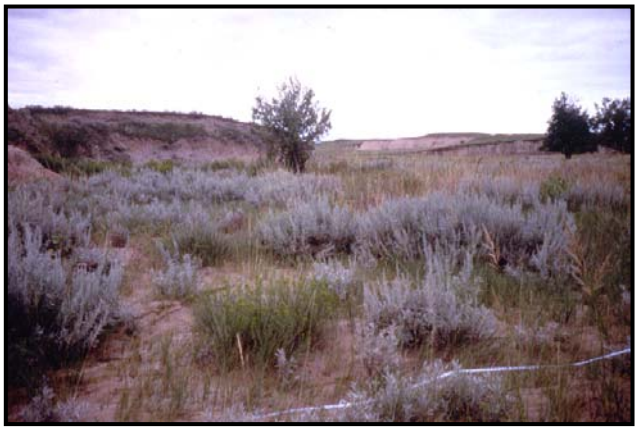
11. Shrub thickets along river and creek banks, predominantly silver buffaloberry (although Russian-olive often is sometimes present), silvery green color, dense, spiny, impenetrable.
***Shepherdia argentea* Shrubland**. (Map Unit 25)

11. Shrub thickets along river and creek banks, wet and moist drainages, and around pond and wetland margins, predominantly sandbar willow, gray-green color, dense, penetrable.
***Salix exigua* Temporarily Flooded Shrubland**. (Map Unit 38)

12. Shrubs 1-1.5 m tall, occupying saline clay hardpans, predominantly greasewood, yellow-green with white stems, brittle, spiny, cover often between 10 and 25%.
***Sarcobatus vermiculatus / Pascopyrum smithii* Shrubland**. (Map Unit 39)

12. Shrubs not spiny, typically shorter than 1 m tall, occupying floodplains, draws, depressions, swales, and oxbows, predominantly silver sagebrush and western snowberry (**13**).

13. Short-statured silver sagebrush shrubs, <1.5 m tall, occupying shrub savannas (10-25% cover) within river and creek floodplains, draws, gentle slopes, and depressions in relatively open stands. Shrub cover often <25%, but may vary.
***Artemisia cana / Pascopyrum smithii* Shrubland**. (Map Unit 31)



13. Short-statured western snowberry and poison-ivy shrubs, <0.5 m tall, forming rounded colonies in oxbows, moist drainages, swales, and depressions.
***Symphoricarpos occidentalis* Shrubland**. (Map Unit 37)


14. Shrubs of draws, drainages, and old river oxbows, and often occurring along the margin of hardwood woodlands, 0.5 to 4 m tall, predominantly American plum with a mixture of other mesic shrubs, forming a nearly impenetrable thicket.
***Prunus virginiana – (Prunus americana)* Shrubland**. (Map Unit 34).


14. Shrubs of drier sites, predominantly three-leaved sumac and rabbitbrush, occupying ridges, steep slopes, sandhill margins, and cut and fill slopes along roadways (**15**).

15. Site supporting predominantly three-leaved sumac shrubs, on naturally distributed rocky or gravelly substrate on ridgelines and/or adjacent to steep drainages, in old river oxbows, and along the margins of sandhill formations; shrub cover is often between 10 and 25%.
***Rhus trilobata / Carex filifolia* Shrub Herbaceous Vegetation**. (Map Unit 35).

15. Site supporting predominantly rabbitbrush, on disturbed substrate, usually cut and fill slopes adjacent to roadways (rabbitbrush is also a minor component of the Badlands Sparse Vegetation Complex).
***Chrysothamnus nauseosus* Shrubland**. (Map Unit 33)

16. Site a prairie dog town, replete with burrow mounds and barking critters (except in recently abandoned sites); predominantly weedy native forbs and introduced grasses or western wheatgrass, blue grama, and/or buffalo grass.
Prairie Dog Town Complex. (Map Unit 1)


16. Site not a prairie dog town, although burrowing activity by other fossorial mammals (pocket gophers, ground squirrels) and bison wallows may be evident, predominantly upland grasses or grass-like wetland species (**17**).

17. Site predominantly, >70%, introduced/exotic, perennial grasses, along roadways and in abandoned fields, especially *Bromus inermis, Poa pratensis, and Agropyron cristatum.* *Pascopyrum smithii* may be a common associate in any of these sites.

Introduced Grassland (Map Unit 17)

Three semi-natural or introduced grassland associations may occur:
Bromus inermis – (Pascopyrum smithii) Semi-natural Herbaceous Vegetation;
Poa pratensis – (Pascopyrum smithii) Semi-natural Herbaceous Vegetation;
Agropyron cristatum - (Pascopyrum smithii) Semi-natural Herbaceous Vegetation.


17. Site predominantly native, perennial grass or grass-like species (**18**).

18. Plants occupying wetlands, drainages, seeps, springs, and pond margins, predominantly switchgrass, prairie cordgrass, spike-rush, smartweed, cattail, and bulrush (**19**).

18. Grassland species of upland soils ranging from clayey to sandy range sites and occupying various topographical positions (**20**).

19. Site with saturated to moist soils supporting predominantly rhizomatous grass and grass-like plants, e.g., prairie cordgrass, cattail, bulrush, spike-rush, rush, and/or sedge. (**20**)

19. Site with saturated to moist soils supporting predominantly bunchgrasses, *e.g.,* switchgrass, alkali sacaton, and little bluestem.

***Panicum virgatum* Herbaceous Vegetation.** (Map Unit 12)

20. Sites with saturated to moist soils dominated by relatively tall rhizomatous grass and grass-like plants, e.g. cattails, bulrushes, cordgrass (**21).**

20. Sites with saturated to moist soils dominated by short rhizomatous grasses and grass-like plants, e.g. spikerush.

***Eleocharis palustris* Herbaceous Vegetation. (**Map Unit 14)

21. Sites with saturated to moist soils dominated by cattails and bulrushes.
***Typha spp. - Scirpus spp.* – Mixed Herbs Great Plains Herbaceous Vegetation**.
(Map Unit 14)

21. Sites with saturated to moist soils dominated by prairie cordgrass and sedges.
***Spartina pectinata – Carex spp.* Herbaceous Vegetation**. (Map Unit 14)

22. Site on clayey and silty range sites, occupying drainages, valleys, hillsides, supporting predominantly rhizomatous grasses and some bunchgrasses, occasionally dominated by yellow or, less often, white sweet clover (**23**).

22. Site on sandy or very shallow range sites, occupying tables, plains, hilltops, hillsides, depressions, and breaks; supporting stoloniferous grasses and bunchgrasses, short to tall in height (**24**).

23. Site dominated by western wheatgrass, usually in association with needle-and-thread grass, threadleaf sedge, blue grama, and/or little bluestem.
***Pascopyrum smithii – Bouteloua gracilis – Carex filifolia* Herbaceous Vegetation**.
(Map Unit 16)

23. Site dominated by western wheatgrass in association with green needlegrass.
***Pascopyrum smithii - Nassela viridula* Herbaceous Vegetation**. (Map Unit 19, occasionally Map Unit 16)

24. Site on sandy or very shallow range sites, typically dominated by short to medium tall grasses, such as blue grama, buffalo grass, little bluestem, needle-and-thread grass, and/or threadleaf sedge. (**25**).

24. Sites on sand hills or silt deposits along intermittent streams, typically dominated by mid to tall grasses, especially prairie sandreed, with needle-and-thread and blue grama as common associates.

***Calamovilfa longifolia / Carex filifolia* Herbaceous Vegetation.** (Map Unit 16 on silty sites, Map Unit 32 on sand hill sites)

25. Site on sandy and loamy sand range sites, typically grazed on a regular basis, dominated by short grasses, including blue grama, threadleaf sedge, purple three-awn, needle-and-thread, and buffalograss.

***Bouteloua gracilis – Buchloe dactyloides* Xeric Soil Herbaceous** or
***Stipa comata – Bouteloua gracilis – Carex filifolia* Herbaceous Vegetation** (Both types may occur in BADL but there is insufficient information available at this time to provide reliable field key characteristics to distinguish them.) (Map Unit 18)

25. Site on very shallow range sites, occupying breaks, hillslopes, drainages, broad drainages, and hilltops, dominated by the medium tall grasses little bluestem and sideoats grama. ***Schizachyrium scoparium - Bouteloua (curtipendula, gracilis) – Carex filifolia* Herbaceous Vegetation.** (Map Unit 15)